Abstract of th Disclosure

A system and method of fluctuation enhanced gas-sensing using SAW devices includes processes for improved chemical analyte detection, identification, and quantification through the measurement and spectral analysis of frequency fluctuations in the instantaneous frequency of a chemical sensor arranged to produce an oscillatory output signal when exposed to chemical substances. The system and method may use a chemical sensor, such as a surface acoustic wave (SAW) device. The spectral analysis produces the power spectral density of the frequency fluctuations, which are represented as a pattern that includes information about the analyte(s) such as, total adsorbed gas mass and diffusion coefficients. The diffusion coefficients may then be used to determine the number of molecule types and/or the concentration of each.